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ABSTRACT

Sex differences in attributions for success and failure in algebra of Samoan community college students were examined and compared with attributions of a large group of mainland U.S. students. study included the Mathematics Attribution Scale: Algebra Version (MAS), which assessed students' attributions of achievement in algebra to their effort, their ability, the task, and the environment; the Achievement Motivation Scale, which assessed the degree to which an individual was trying to succeed in school; the Rosenberg Self-Esteem Scale, which measured the self-acceptance aspect of self-esteem; and the Anxiety Scale, which assessed areas of general anxiety. The instruments were administered in class to 127 students enrolled at American Samoa Community College in March 1985. Results were compared with findings from a 1972 study of high school students in Minnesota and Wisconsin. Study findings included the following: (1) men and women students did not differ in their attributions for success and failure in algebra as measured by the MAS; (2) in comparison to mainland students, Samoan students reported a significantly greater attribution for success in algebra to their effort and to a conducive learning environment, and attributed failure to the difficulty of the task to a significantly lesser extent; and (3) Samoan students who attributed their success to their ability tended to be less anxious and have greater self-esteem, while those who attributed their failure to their lack of ability tended to be more anxious. (AYC)

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ATTRIBUTIONAL PROFILES OF SAMOAN COMMUNITY COLLEGE STUDENTS

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ATTRIBUTIONS FOR SUCCESS AND FAILURE IN ALGEBRA OF SAMOAN COMMUNITY COLLEGE STUDENTS: A PROFILE ANALYSIS

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Running head: SAMOAN

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Abstract

Attributions for success and failure in algebra of 127 Samoan community college students were examined. Profile analysis indicated that men and women did not differ in their attributions for success and failure in algebra as measured by the Mathematics Attribution Scale. Hotelling's T^2 statistic revealed Samoan students differed from mainland students in their attributions for success in algebra to their effort and to a conducive learning environment as well as their attributions of failure in algebra to the difficulty of the task. Correlates of the attributions were examined with achievement motivation, anxiety, and self-esteem.

The manner in which individuals ascribe causes for events has long been a concern of attribution theorists (Weiner, 1980; Weiner, Frieze, Kukla, Read, Rest, and Rosenbaum, 1971). The relationships between attributions and achievement motivation, expectancy of success, and confidence have been the focus of substantial research. Educational researchers are particularly interested in the effects of causal ascriptions on the strivings of students. Attributions of success to one's efforts appear to lead to increased achievement motivation because effort is controllable and tends to increase in response to success. When one attributes success to one's ability, the result is not clearly increased motivation because ability is often considered uncontrollable. Betancourt and Weiner (1982) reported that attributions of success to internal, ego-related causes increase self-worth, and attributions of failure to internal causes decrease self-worth and self-esteem. Dweck (1975) noted that attributions to one's ability result in less effort to alter future patterns of motivation than do attributions to effort. Andrews and Debus (1978) found that when failure is attributed to a stable cause, future failure would be anticipated and expectancy of success would be decreased. Further, the locus of one's attributions (internal or external) has been found to have practical results in moderating the effects of life stressors such as anxiety and depression (Johnson & Sarason, 1978).

Weiner (1980) proposed a three-dimensional taxonomy of attributional patterns: locus (internal/external), stability (stable/unstable),

and controllability (controllable/uncontrollable. The behavioral consequences of these dimensions of attributions were amply described in Weiner (1980). For example, ability would be internal, stable and uncontrollable, and effort would be internal, unstable, and controllable. A task and an environment would be external and uncontrollable. In many geographic locations of the world, these dimensions have not been examined to determine their generalizability and invariance. One region where attribution research has been particularly limited is in the South Pacific.

The Samoan archipelago consists of fourteen islands in the South Pacific which are divided into American and Western Samoa. American Samoa is an unincorporated U.S. territory with a land mass of 197 square kilometers and a population of 30,000. It is generally mountainous with one of the world's most scenic harbors, Pago Pago. American Samoa has been substantially influenced by American money, ideas, products and institutions. The availability of educational television and video cassettes bring popular programs and movies to the Samoan home. English is the official medium of instruction, however, schooling is begun in the Samoan language with a gradual shift to nearly 100% English in the high school.

The purpose of the present study was to examine sex differences in attributional patterns of Samoan community college students, and to compare the attributions of these students with a large group of mainland American students. Correlations of attributional measures

and achievement motivation, self-esteem, and anxiety were examined to provide further understanding of attributions of Samoan community college students. Because of the lack of attributional research in the community colleges and in the South Pacific, this study will contribute to an increased understanding of the attributional processes of students in a remote area of the world.

Method

Sample

The sample consisted of 127 Samoan students (58 men and 69 women) enrolled in the American Samoa Community College. A student was classified as Samoan (a) if the student was born in American or Western Samoa or (b) if the student was of Samoan parentage and resided in American Samoa. The age of the men was 21.8 years and women was 20.0 years. A total of 36% had taken algebra as their most advanced mathematics course in high school, 41% had taken geometry, and 23% had taken advanced mathematics. The average grade of the students in their mathematics courses was 2.7 on a scale from A (4.0) to F (0.0). A comparison group was used consisting of 1224 students (647 girls and 577 boys) enrolled in the 9th and 10th grade of 10 Wisconsin and Minnesota high schools.

Instrument

The Mathematics Attribution Scale: Algebra version (MAS) (Fennema, Wolleat, and Pedro, 1979) is a 32-item scale designed

to assess high school students' attributions of achievement in algebra to their effort, their ability, the task, and the environment. The environment referred to the learning environment such as the teacher was good at explaining algebra or the students did not pay attention. Four 4-item subscales assess the attributions of success in algebra to effort, ability, the ease of the task, of learning algebra and a conducive learning environment. The other four 4-item subscales assessed the attributions of failure in algebra to lack of ability, lack of effort, the difficulty of the task, of learning algebra, and to a poor learning environment. Each statement in the scale was rated from 1 (Strongly Disagree) to 5 (Strongly Agree). The reliabilities of the subscales were reported by Powers, Douglas, and Choroszy (1984) to be (a) the attributions of success to ability .84, to effort .80, to the task .30, and to the environment .50, and (b) the attributions of failure to ability .73, to effort .66, to the task .54, and to the environment .48. Some supportive evidence of the factorial validity of the MAS was reported by Choroszy, Powers, and Douglas (1984), and of the concurrent validity of the MAS by Powers, Douglas, Lopez, and Rossman (in press).

The Achievement Motivation Scale was adapted from Myers' (1965) Achievement Motivation Scale. It was designed to assess the degree to which an individual was trying to succeed in school. Six items concerned striving for, disposition toward, or interest in class assignments or grades. A 5-point response format ranged from 1 (Strongly Disagree) to 5 (Strongly Agree).

The Rosenberg (1965) Self-esteem scale is a 10-item scale developed with high school students to measure the self-acceptance aspect of self-esteem. Silbert and Tippett (1965) reported validity coefficients for the scale ranging from .56 to .86 with several similar measures.

The Anxiety Scale is a 6-item scale adapted from Taylor's (1953) Manifest Anxiety Scale. Items were selected which appeared to assess areas of general anxiety. Items which might be offensive to students or parents were omitted. Each item was a statement of one's worry, lack of happiness, or lack of confidence about general topics such as other individuals, and one's trouble. Ratings on each statement were on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

Procedure

American Samoa Community College instructors administered the MAS and the other measures to their classes comprised of full-time students in March of 1985. The instructors told the students that the purpose of the survey was to gather research data concerning the mathematics attitudes of students attending the college. Instructions were printed on the MAS and also read aloud by the instructors. Students were given as much time as they needed during their 50 minute class period. The comparison group of mainland students was administered the MAS as part of a normative study by Fennema et al. (1972).

It was believed that the large comparison group would be suitable because it was reported to be representative of rural, urban, and suburban high schools and was probably representative of high school students. Since the MAS has not been administered to community college students, comparing Samoan student attributions with this group of high school students would be informative.

Data Analysis

This study utilized profile analysis (Harris, 1975; Johnson and Wichern, 1982) and Hotelling's T^2 statistic to examine the differences between the attributions of Samoan men and women students and to compare Samoan students with a large group of mainland students. Hotelling's one-sample T^2 statistic is a multivariate data analytic procedure which is useful for comparing a vector of sample means from a single population with an hypothesized mean vector. For many research problems in education and psychology, a test of the equality of mean vectors is particularly useful, since multivariate observations on subjects are the rule rather than the exception and repeated univariate tests run the risk of increasing the probability of Type I errors from the battery of tests. In profile analysis, Hotelling's T^2 test of the hypothesis of the equality of mean vectors is divided into three specific questions which are posed in stages: (a) Are the profiles of two groups parallel?, (b) Assuming the profiles are parallel, are the profiles coincident?,

and (c) Assuming the profiles are coincident, are the profiles level? Coincident profiles would imply that neither profile is above nor below the other. The profile analysis was performed with a computer program written for this study (Powers and Lopez, in press).

Results and Discussion

The hypotheses of parallel and coincident attributional profiles of Samoan college men and women appeared to be tenable. The mean responses of Samoan men and women students on the eight subscales of the MAS appeared to be parallel, $F(7, 118) = .64$, $p < .721$. Further, both profiles appeared to be coincident, $F(1, 124) = 1.76$, $p < .183$.

The hypothesis of level profiles was rejected $F(7, 118) = 169.07$, $p < .0001$. As can be seen in Table 1, the combined means of the men and women showed large variation in their responses on the eight subscales of the MAS. For example, the attribution of success in algebra to a favorable learning environment ($M = 14.87$) was substantially higher than the attribution of failure to a poor environment ($M = 11.17$). Because the male and female profiles were parallel and coincident, their responses were combined to obtain an overall estimate of Samoan college students. These students were then compared with the mainland student group as the hypothesized population.

The hypothesis that the attributional means of the Samoan students were equal to the mainland students was rejected. Hotelling's T^2

statistic indicated a significant difference between the Samoan students' mean vector and the mainland group's mean vector, $T^2 = 98.27$, $F(8, 118) = 11.60$, $p < .0001$. When the null hypothesis is rejected, this indicates one or more of the sample means, or some combination of means, differs too much from the hypothesized values (Johnson, 1982). Following this, each sample mean was compared with its corresponding mainland group mean to determine the source of the difference. Bonferroni planned comparisons (Kirk, 1968) were conducted with the experimentwise alpha level for the eight comparisons set at .05. To maintain the experimentwise alpha level, any comparison would have to reach a probability level of .006 (i.e. .05/8) in order to be declared significant.

Samoan college students appeared to differ with the mainland students on three attributional measures. Samoan students reported a significantly greater attribution for success in algebra to effort ($M = 14.65$) than did the mainland students ($M = 12.92$), $t(126) = 6.43$, $p < .05$. In addition, Samoan students' mean attribution of success to a conducive learning environment was 14.87, as compared with the mainland students' mean attribution of 13.81. A t test indicated these means were significantly different, $t(126) = 4.24$, $p < .05$. Samoan students' mean attribution of failure to the difficulty of the task of learning algebra ($M = 12.28$) was signficantly less than the mainland students' attribution ($M = 13.61$), $t(126) = 5.33$, $p < .05$. Refer to Table 1.

The intercorrelation of anxiety, self-esteem and motivation among Samoan students was examined. Refer to Table 2. A substantial and significant ($p < .01$) negative correlation between self-esteem and anxiety ($r = -.59$) was found. This correlation accounted for 35% of the shared variance of the two measures. Further, it indicated that Samoan students with low self-esteem tended to have high anxiety. Another significant correlation ($p < .01$) was found between achievement motivation and self-esteem of $r = .28$. This indicated a small tendency for students with high achievement motivation to also have high self-esteem.

The correlations between each subscale of the MAS and anxiety, self-esteem, and motivation were examined. The correlations between attributions for success in algebra to one's ability were negatively correlated -.23 with anxiety. This indicated that those students who attributed their success to their ability tended to be less anxious. As might be expected, those who attributed their failure in algebra to lack of ability tended to be more anxious ($r = .23$). Self-esteem was correlated .24 with the attribution of success to ability and it was correlated -.20 with the attribution of failure to lack of ability. This indicated that the attribution of success to one's ability in algebra was linked with higher self-esteem. These small correlations accounted for approximately 5% or less of the variance between two measures and may not be especially meaningful and have limited value. Indeed, a correlation of .23 would reach significance on the basis of the number of subjects yet account for only 5% of the common variance.

Several important findings have been reported in this study. Attributional patterns of Samoan men and women community college students appear to be invariant, but the Samoan students differed from mainland students on three attributional measures. From attribution theory, the attribution of success in algebra to one's effort will tend to lead to increased effort. The attribution of success to one's conducive learning environment reflects on the Samoan school system. Moreover, Samoans do not appear to attribute their failure in algebra to the difficulty of learning algebra as much as do mainland students. A surprising correlational finding was encountered between self-esteem and anxiety. Such a substantial negative correlation, if replicable, indicates that students who are likely to be more anxious can be partially predicted with a 10-item self-esteem inventory, or more directly with the 6-item anxiety measure used in this study. Such an early identification of anxious students would be useful in a comprehensive counseling program.

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Table 1

Samoan Mean Scores and a Comparison (Norm) Group Mean Scores on the Mathematics Attribution Scale: Algebra

Subscale	Samoans		Norm	
	M	SD	M	t
Success				
Ability	12.79	3.11	12.60	.66
Effort	14.65	3.03	12.92	6.43*
Task	13.52	2.64	13.20	1.30
Environment	14.87	2.81	13.81	4.24*
Failure				
Ability	12.18	3.15	11.94	.85
Effort	12.69	3.43	13.03	-1.12
Task	12.28	2.71	13.61	-5.53*
Environment	11.17	2.61	10.85	1.35

*$p < .05$.

Table 2

Correlations Between Attributions and Anxiety, Self-esteem, and Achievement Motivation of Samoan Students

Subscale	Anxiety	Self	Motivation
Success			
Ability	-.23**	.24**	.19*
Effort	-.02	.01	.18*
Task	.01	.05	.16
Environment	.03	-.02	.10
Failure			
Ability	.23**	-.20*	-.10
Effort	.17*	-.14	-.13
Task	.13	-.11	-.13
Environment	.12	-.09	-.06
Anxiety	___	-.59**	-.02
Self-esteem	-.59**	_____	.28**
Motivation	-.02	.28**	_____

*$p < .05$. **$p < .01$.

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